



Jay M. Ignacio, P.E.
President

June 26, 2012

PUBLIC UTILITIES
COMMISSION

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The Honorable Chair and Members of the
Hawaii Public Utilities Commission
Kekuanaoa Building
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Commissioners:

Subject: HELCO Annual Service Reliability Report for 2011

Hawaii Electric Light Company, Inc. respectfully submits a copy of its Annual Service Reliability Report for the year 2011.

Sincerely,

Attachment

c: Division of Consumer Advocacy (with Attachment)



Hawaii Electric Light Co., Inc.

ANNUAL SERVICE RELIABILITY REPORT
2011

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Manager
Distribution Department

June 12, 2012

CONTENTS

ANNUAL SERVICE RELIABILITY REPORT

Introduction	1
Summary of 2011 Reliability Data.....	1

APPENDIX A

Definition of Terms.....	A-1
--------------------------	-----

APPENDIX B

Reliability Indices	B-1
---------------------------	-----

APPENDIX C – ALL CAUSES

Table: 2006-2011 Annual Service Reliability Indices	C-1
Graph: Average Service Availability Index (ASA)	C-2
Graph: System Average Interruption Frequency (SAIF)	C-3
Graph: Customer Average Interruption Duration (CAID).....	C-4
Table: 2011 Service Reliability Summary – Normalized	C-5
Table: 2011 Service Reliability Summary – Not Normalized.....	C-6
Table: 2011 System Interruption Cause Report – Not Normalized	C-7

APPENDIX D – T&D vs GENERATION

Table: 2006-2011 Service Reliability Indices	D-1
Graph: Average Service Availability Index (ASA)	D-2
Graph: System Average Interruption Frequency (SAIF)	D-3
Graph: Customer Average Interruption Duration (CAID).....	D-4
Table: 2011 T&D Service Reliability Summary – Not Normalized.....	D-5
Table: 2011 Generation Service Reliability Summary – Not Normalized	D-6
Graph: 2006-2011 Interruption Caused by Trees & Branches	D-7

APPENDIX E – HELCO vs NON-HELCO GENERATION

Table: 2006-2011 Service Reliability Indices	E-1
Table: 2011 HELCO Generation Service Reliability Summary	E-2
Table: 2011 Non-HELCO Generation Service Reliability Summary	E-3

APPENDIX F – NORMALIZED DATA

Table: 2011 T&D Service Reliability Summary	F-1
Table: 2011 Generation Service Reliability Summary.....	F-2

INTRODUCTION

The 2011 service reliability indices and the system reliability indices for the past five years are provided to depict HELCO's quality of service. A summary of 2011 system reliability data is provided in the subsequent sections. Definitions of terms and descriptions of the reliability indices are attached in Appendices A and B. Reliability data are presented in tables and graphs contained in Appendices C through E.

SUMMARY OF 2011 RELIABILITY DATA

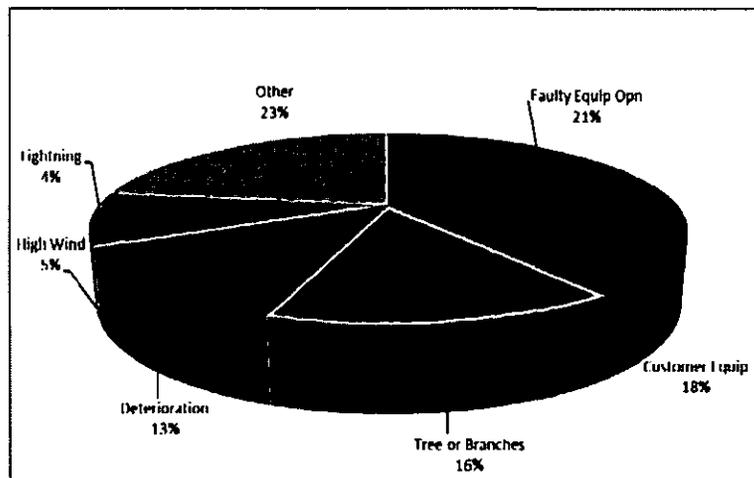
The average customer count increased 0.79% from 80,171 in 2010, to 80,807 in 2011

On a Not-Normalized basis, in 2011 a total of 290,616 Customer Interruptions were recorded for a total of 242,120 Customer Hours of Interruption. The System Average Interruption Frequency (SAIF) index was 3.596 and the Customer Average Interruption Duration (CAID) was 49.99 minutes.

On the Normalized basis, a total of 236,688 Customer Interruptions were recorded for a total of 232,981 Customer Hours of Interruptions. The System Average Interruption Frequency (SAIF) index was 2.929 and the Customer Average Interruption Duration (CAID) was 59.06 minutes.

On a Not-Normalized basis, the following were the leading causes of customer interruptions in 2011:

1. **Faulty Equipment Operation.** There were 61,594 Customer Interruptions, 56,071 (91%) of those were related to HELCO Generation.
2. **Failure of Customer Equipment.** There were 53,778 Customer Interruptions, 53,775 (nearly 100%) of those were related to Independent Power Producers (non-HELCO Generation).
3. **Trees and Branches.** There were 45,152 Customer Interruptions.
4. **Deterioration.** There were 37,112 Customer Interruptions.



There were 109,846 generation related Customer Interruptions in 2011, of which 56,071 were related to HELCO generation sources (51%) and 53,775 were related to Independent Power Producer (non-HELCO Generation) sources (49%).

In 2011, HELCO generation sources experienced 10 load shedding events. HELCO generation experienced 6 load shed events, Puna Geothermal Ventures (PGV) experienced 2 load shed events, and Hamakua Energy Partners (HEP) experienced 2 load shed events.

HELCO normalized data per guidelines specified in a special report on reliability prepared for the Public Utilities Commission. This report, "Methodology for Determining Reliability Indices for HECO Utilities", dated December 1990, indicates that normalization may be utilized for "abnormal" situations such as hurricanes, tsunamis, earthquakes, floods, catastrophic equipment failures, and a single equipment outage that cascades into a loss of load that is greater than 10% of the system peak load. HELCO normalized three events in 2011:

- Underfrequency Loadshedding event on June 30 due to Keahole CT4 tripping off-line resulted in 12,643 Customer Interruptions and 1,963 Customer Hours of Interruption.
- Underfrequency Loadshedding event on July 16 due to Keahole CT-5 and ST-7 tripping off-line resulted in 14,999 Customer Interruptions and 1,052 Customer Hours of Interruption.
- Underfrequency Loadshedding event on August 2 due to Hamakua Energy Partners (HEP) CT1, CT2 and ST resulted in 26,286 Customers Interruptions and 6,124 Customer Hours of Interruption.

Significant interruptions, contributing more than 5,000 Customer Interruptions (CI) or Customer Interruption Duration (CID) greater than 5,000 Customer Hours of Interruption, that did not meet the normalization criteria were:

<u>Date</u>	<u>Problem</u>	<u>CI</u>	<u>CID</u>
January 4	Motor vehicle accident along Kahakai Blvd.	1,689	9,290
January 7	Distribution overhead conductors sagging due to pole deterioration.	2,763	6,961
February 24	Lightning affecting distribution circuit.	2,941	6,176
May 17	Transformer failure at Waimea Substation.	1,991	6,935
May 26	Complete permanent repairs for transformer failure at Waimea Substation.	1,991	7,918
October 25	Underfrequency Loadshedding – Puna Geothermal Ventures tripped offline.	12,482	719
November 11	Substation flashover affecting distribution circuits.	1,716	5,934

<u>Date</u>	<u>Problem</u>	<u>CI</u>	<u>CID</u>
November 16	Underfrequency loadshedding – Keahole CT5 and ST7 tripped offline.	21,347	2,509
November 17	Scheduled maintenance at Waimea Substation and Kohala Mountain transmission circuit.	1,990	15,218
November 26	High winds affecting transmission circuit.	14,599	2,915
December 17	Deterioration affecting transmission circuit.	18,712	616
	Total	82,221	65,192

APPENDIX A DEFINITION OF TERMS

OUTAGE

The state of component when it is not available to perform its intended function due to some event directly associated with that component. An outage may or may not cause an interruption of service to customers depending on system configuration.

INTERRUPTION

The loss of service to one or more customers and is a result of one or more component outages.

INTERRUPTION DURATION

The period from the initiation of an interruption to a customer until service has been restored to that customer.

MOMENTARY INTERRUPTION

An interruption that has a duration limited to the period required to restore service by automatic or supervisory-controlled switching operations or by manual switching at locations where an operator is immediately available. Such switching operations must be completed in a specific time not to exceed one minute. Previous issues of this report indicated that a momentary interruption has a duration not to exceed five minutes. A December 1990 report "Methodology for Determining Reliability Indices of HELCO" indicated that momentary interruptions will have a duration less than one minute.

SUSTAINED INTERRUPTION

Any interruption not classified as a momentary interruption. Only this type of interruption is included in the reliability indices which follow. In conformance with the guidelines established in the report, "Methodology for Determining Reliability Indices for HELCO", dated December 1990, a sustained interruption has a duration of one minute or longer.

CUSTOMER INTERRUPTION

One interruption of one customer. NOTE: Interruption to customers at their request (e.g., customer maintenance) is not considered.

APPENDIX B RELIABILITY INDICES

Reliability indices used in this report conform to standards proposed by both the Edison Electric Institute (EEI) and the Institute of Electrical and Electronics Engineers (IEEE) unless otherwise indicated in the above definitions. Three reliability indices that convey a meaningful representation of the level of reliability were selected and are presented in this report. These reliability indices are as follows:

AVERAGE SERVICE AVAILABILITY INDEX (ASA)

Total customer hours actually served as a percentage of total customer hours possible during the year. This indicates the extent to which electrical service was available to all customers. This index has been commonly referred to as the "Index of Reliability." A customer-hour is calculated by multiplying the number of customers who are affected by the length of time they are affected.

SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX (SAIF)

The number of customer interruptions per customer served during the year. This index indicates the average number of interruptions experienced by all customers serviced on the system.

CUSTOMER AVERAGE INTERRUPTION DURATION INDEX (CAID)

The interruption duration per customer interrupted during the year. This index indicates the average duration of an interruption for those customers affected by a sustained interruption.

SYSTEM AVERAGE INTERRUPTION DURATION INDEX (SAID)

The interruption duration per customer served during the year. This index indicates the average interruption duration experienced by all customers serviced on the system.

These four reliability indices give a good indication of how reliable the electrical service is to the customer:

1. ASA - Is electrical service available most of the time.
2. SAIF - How often an outage occurs (for each customer).
3. CAID - How long an outage might last (for affected customers only).
4. SAID - How long an outage might last (for each customer).

The average number of customers on the system for the year is used for the value of number of customers served during the year and only sustained interruptions are considered.

**APPENDIX C
ALL CAUSES
2006-2011 Annual Service Reliability Indices**

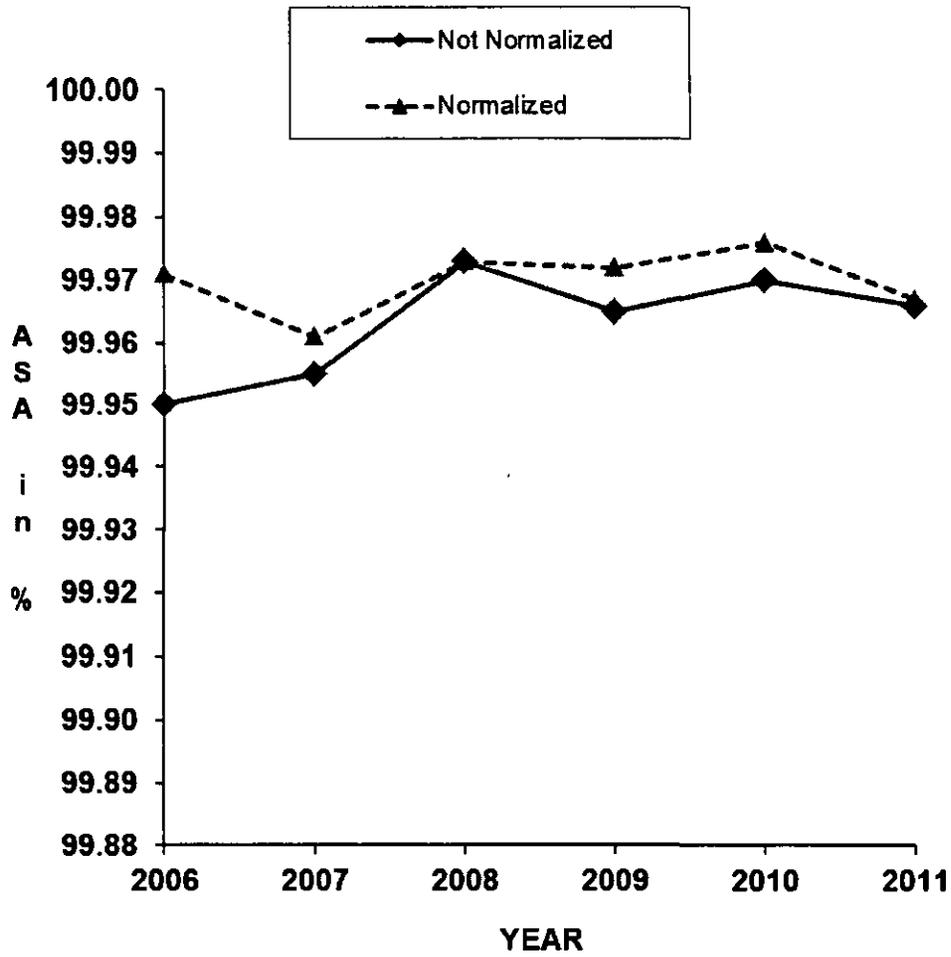
Normalized

Year	ASA	Number of Customers	Customer Interruptions	CID	SAIF	CAID
2006	99.971	75,353	188,602	190,061	2.503	60.46
2007	99.961	77,933	208,000	269,475	2.669	77.73
2008	99.973	79,386	179,862	189,156	2.266	63.10
2009	99.972	79,679	246,437	197,371	3.093	48.05
2010	99.976	80,171	176,622	169,522	2.203	57.59
2011	99.967	80,807	236,688	232,981	2.929	59.06

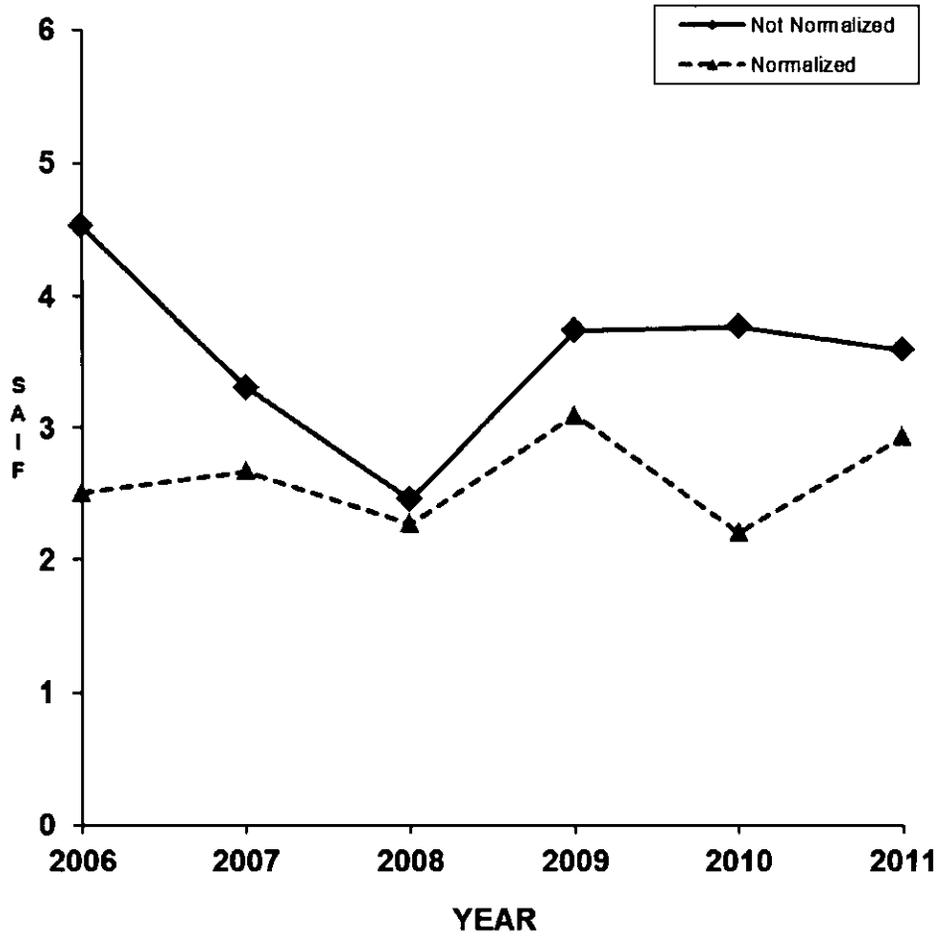
Not-Normalized

Year	ASA	Number of Customers	Customer Interruptions	CID	SAIF	CAID
2006	99.95	75,353	341,289	328,758	4.529	57.80
2007	99.955	77,933	257,924	305,681	3.31	71.11
2008	99.973	79,386	194,807	190,314	2.454	58.62
2009	99.965	79,679	298,334	246,916	3.744	49.66
2010	99.97	80,171	302,402	207,607	3.772	41.19
2011	99.966	80,807	290,616	242,120	3.596	49.99

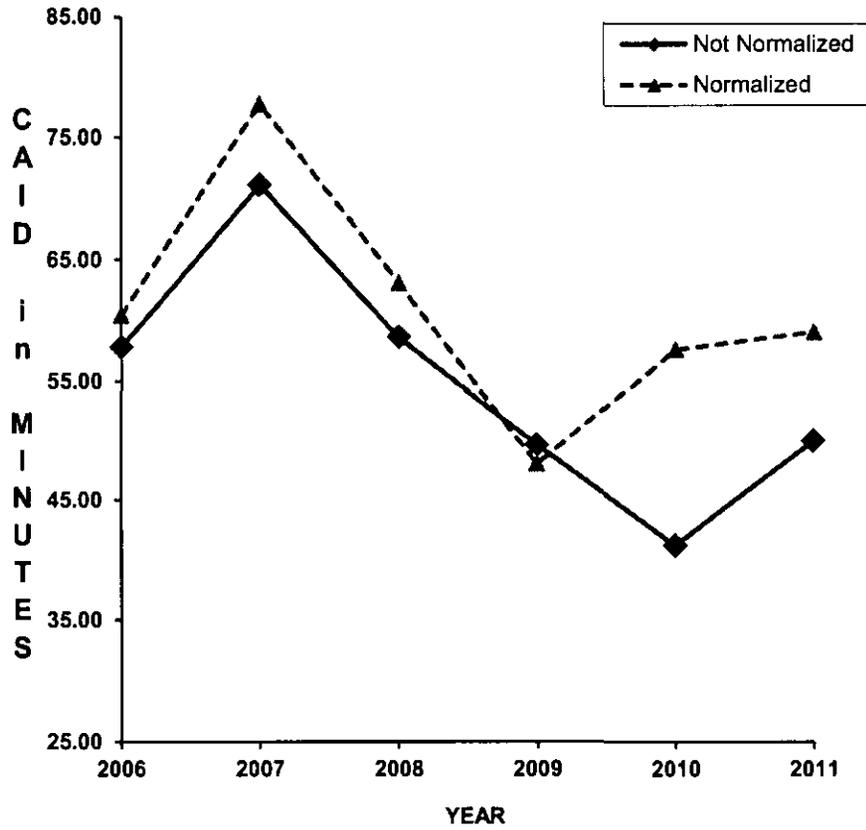
AVERAGE SERVICE AVAILABILITY INDEX (ASA IN %)



SYSTEM AVERAGE INTERRUPTION FREQUENCY (SAIF)



CUSTOMER AVERAGE INTERRUPTION DURATION (CAID)



2011
SERVICE RELIABILITY SUMMARY
Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Tree or Branches	76116.3	45152	0.559	56.52	101.15	1
Deterioration	24281.3	37112	0.459	18.03	39.26	3
Faulty Equip Opn	4628.3	33952	0.420	3.44	8.18	11
Customer Equip	1752.2	27492	0.340	1.30	3.82	15
High Wind	3031.8	14686	0.182	2.25	12.39	12
Auto Accident	22483.5	13029	0.161	16.69	103.54	4
Tsf Failure	20890.4	12341	0.153	15.51	101.57	5
Lightning	17801.2	11669	0.144	13.22	91.53	6
Other Persnl Err	568.3	8126	0.101	0.42	4.20	18
Scheduled Maint	26219.9	6654	0.082	19.47	236.43	2
Unknown	6327.1	6562	0.081	4.70	57.85	8
Cable Fault	11070.3	6243	0.077	8.22	106.39	7
Equip Failure	2208.2	5561	0.069	1.64	23.83	13
Forced Maint	1915.1	2589	0.032	1.42	44.38	14
Flashover	6071.5	2393	0.030	4.51	152.23	9
Equip Overload	4921.5	2206	0.027	3.65	133.86	10
Flood / Tsunami	1227.4	329	0.004	0.91	223.84	16
Man or Animal	459.7	316	0.004	0.34	87.28	19
Balance Load	575.3	164	0.002	0.43	210.46	17
Excavate Constr	332.7	63	0.001	0.25	316.81	20
Equip Contact	32.6	12	0.000	0.02	163.00	21
Tsf Overload	15.2	12	0.000	0.01	76.00	23
Loose Connection	14.8	10	0.000	0.01	88.80	25
Vandalism	15.0	5	0.000	0.01	179.60	24
Fire	17.8	4	0.000	0.01	266.25	22
Foreign Objects	2.4	3	0.000	0.00	48.67	26
Balloon/Kite	0.2	2	0.000	0.00	5.00	28
Sys Add/Removal	1.0	1	0.000	0.00	60.00	27
Transfer Load	0.0	0	0.000	0.00	0.00	31
Opn or Sw Error	0.0	0	0.000	0.00	0.00	29
Customer Maint	0.0	0	0.000	0.00	0.00	30
TOTAL	232980.7	236688	2.929	172.99	59.06	

NUMBER OF CUSTOMERS FOR THE 80807 ASA = 99.967%

SAIF = SYSTEM AVERAGE INTERRUPTION

SAID = SYSTEM AVERAGE INTERRUPTION DURATION

CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2011
SERVICE RELIABILITY SUMMARY
Not-Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Faulty Equip Opn	7643.5	61594	0.762	5.68	7.45	9
Customer Equip	7876.6	53778	0.666	5.85	8.79	8
Tree or Branches	76116.3	45152	0.559	56.52	101.15	1
Deterioration	24281.3	37112	0.459	18.03	39.26	3
High Wind	3031.8	14686	0.182	2.25	12.39	13
Auto Accident	22483.5	13029	0.161	16.69	103.54	4
Tsf Failure	20890.4	12341	0.153	15.51	101.57	5
Lightning	17801.2	11669	0.144	13.22	91.53	6
Other Persnl Err	568.3	8126	0.101	0.42	4.20	18
Scheduled Maint	26219.9	6654	0.082	19.47	236.43	2
Unknown	6327.1	6562	0.081	4.70	57.85	10
Cable Fault	11070.3	6243	0.077	8.22	106.39	7
Equip Failure	2208.2	5561	0.069	1.64	23.83	14
Forced Maint	1915.1	2589	0.032	1.42	44.38	15
Flashover	6071.5	2393	0.030	4.51	152.23	11
Equip Overload	4921.5	2206	0.027	3.65	133.86	12
Flood / Tsunami	1227.4	329	0.004	0.91	223.84	16
Man or Animal	459.7	316	0.004	0.34	87.28	19
Balance Load	575.3	164	0.002	0.43	210.46	17
Excavate Constr	332.7	63	0.001	0.25	316.81	20
Equip Contact	32.6	12	0.000	0.02	163.00	21
Tsf Overload	15.2	12	0.000	0.01	76.00	23
Loose Connection	14.8	10	0.000	0.01	88.80	25
Vandalism	15.0	5	0.000	0.01	179.60	24
Fire	17.8	4	0.000	0.01	266.25	22
Foreign Objects	2.4	3	0.000	0.00	48.67	26
Balloon/Kite	0.2	2	0.000	0.00	5.00	28
Sys Add/Removal	1.0	1	0.000	0.00	60.00	27
Transfer Load	0.0	0	0.000	0.00	0.00	31
Opn or Sw Error	0.0	0	0.000	0.00	0.00	29
Customer Maint	0.0	0	0.000	0.00	0.00	30
TOTAL	242120.4	290616	3.596	179.78	49.99	

NUMBER OF CUSTOMERS FOR THE 80807 ASA = 99.966%
 SAIF = SYSTEM AVERAGE INTERRUPTION
 SAID = SYSTEM AVERAGE INTERRUPTION DURATION
 CAID = CUSTOMER AVERAGE INTERRUPTION DURATION
 THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2011
SYSTEM INTERRUPTION CAUSE REPORT
Not-Normalized

CAUSE		No. of Interruptions		Customer Hours	
NON-CONNECTED SYSTEM EMERGENCY	(Totals)	754	25.87%	109139.3	45.08%
Tree or Branches		533	18.28%	76116.3	31.44%
Customer Equip		76	2.61%	7876.6	3.25%
Auto Accident		65	2.23%	22483.5	9.29%
Man or Animal		26	0.89%	459.7	0.19%
Balance Load		21	0.72%	575.3	0.24%
Excavate Constr		12	0.41%	332.7	0.14%
Equip Contact		5	0.17%	32.6	0.01%
Vandalism		5	0.17%	15.0	0.01%
Flood / Tsunami		5	0.17%	1227.4	0.51%
Foreign Objects		3	0.10%	2.4	0.00%
Fire		2	0.07%	17.8	0.01%
Balloon/Kite		1	0.03%	0.2	0.00%
Transfer Load		0	0.00%	0.0	0.00%
ERROR	(Totals)	40	1.37%	568.3	0.23%
Other Persnl Err		40	1.37%	568.3	0.23%
Opn or Sw Error		0	0.00%	0.0	0.00%
WEATHER	(Totals)	394	13.52%	20833.0	8.60%
Lightning		325	11.15%	17801.2	7.35%
High Wind		69	2.37%	3031.8	1.25%
EQUIPMENT FAILURE	(Totals)	556	19.07%	56211.1	23.22%
Deterioration		215	7.38%	24281.3	10.03%
Cable Fault		160	5.49%	11070.3	4.57%
Faulty Equip Opn		109	3.74%	7643.5	3.16%
Equip Failure		49	1.68%	2208.2	0.91%
Flashover		11	0.38%	6071.5	2.51%
Loose Connection		7	0.24%	14.8	0.01%
Equip Overload		5	0.17%	4921.5	2.03%
TRANSFORMER FAILURE	(Totals)	90	3.09%	20905.6	8.63%
Tsf Failure		89	3.05%	20890.4	8.63%
Tsf Overload		1	0.03%	15.2	0.01%
UNKNOWN AFTER TESTS AND INSPECTIONS	(Totals)	162	5.56%	6327.1	2.61%
Unknown		162	5.56%	6327.1	2.61%
MAINTENANCE	(Totals)	918	31.49%	28135.0	11.62%
Scheduled Maint		611	20.96%	26219.9	10.83%
Forced Maint		307	10.53%	1915.1	0.79%
SYSTEM ADDITIONS OR REMOVALS	(Totals)	1	0.03%	1.0	0.00%
Sys Add/Removal		1	0.03%	1.0	0.00%
TOTALS		2915		242120.4	

APPENDIX D
T&D vs. GENERATION
2006-2011 Service Reliability Indices
Not-Normalized

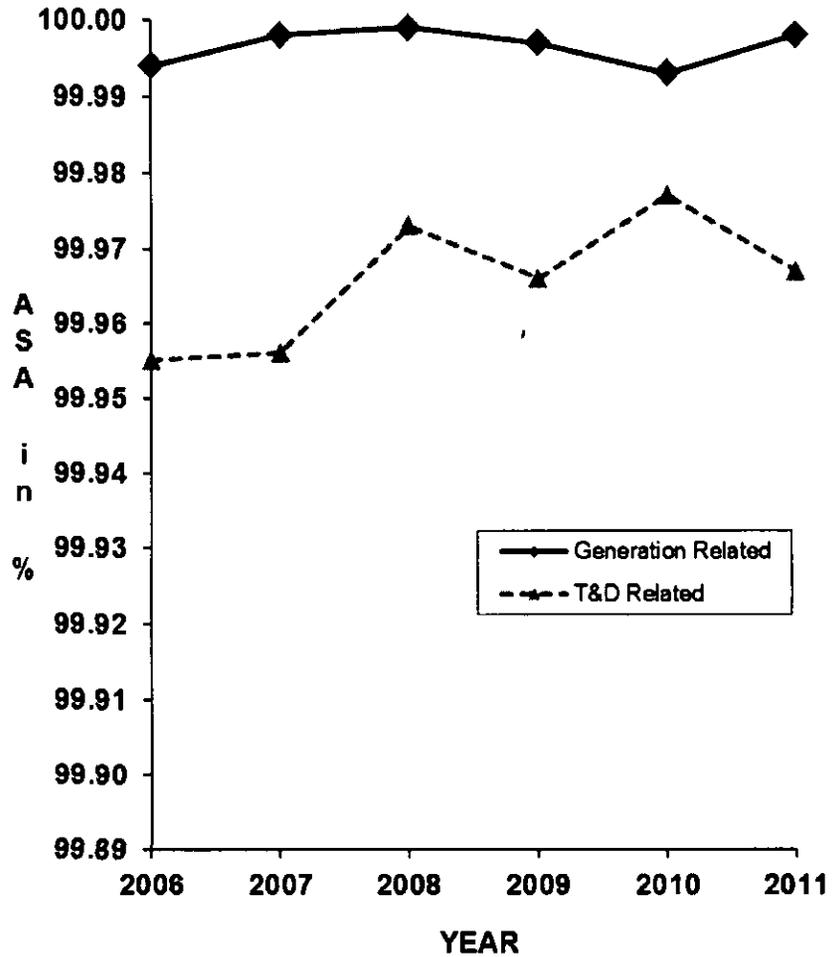
T&D Related Outages Only

Year	ASA	Number of Customers	Customer Interruptions	CID	SAIF	CAID
2006	99.955	75,353	175,438	292,048	2.328	99.88
2007	99.956	77,933	165,461	294,463	2.123	106.78
2008	99.973	79,386	108,517	185,015	1.367	102.30
2009	99.966	79,679	165,478	232,344	2.077	84.24
2010	99.977	80,171	88,321	161,219	1.102	109.52
2011	99.967	80,807	180,770	228,432	2.237	75.82

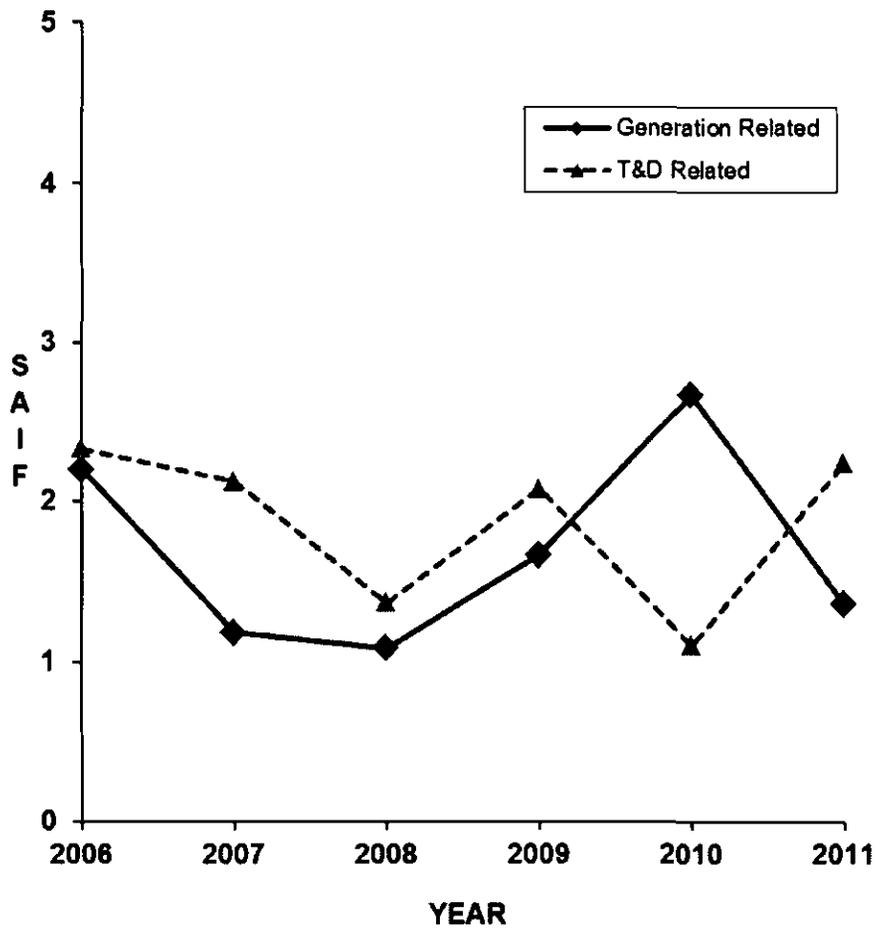
Generation Related Outages Only

Year	ASA	Number of Customers	Customer Interruptions	CID	SAIF	CAID
2006	99.994	75,353	165,851	36,710	2.201	13.28
2007	99.998	77,933	92,463	11,218	1.186	7.28
2008	99.999	79,386	86,290	5,299	1.087	3.68
2009	99.997	79,679	132,856	14,572	1.667	6.58
2010	99.993	80,171	214,081	46,388	2.67	13.00
2011	99.998	80,807	109,846	13,688	1.359	7.48

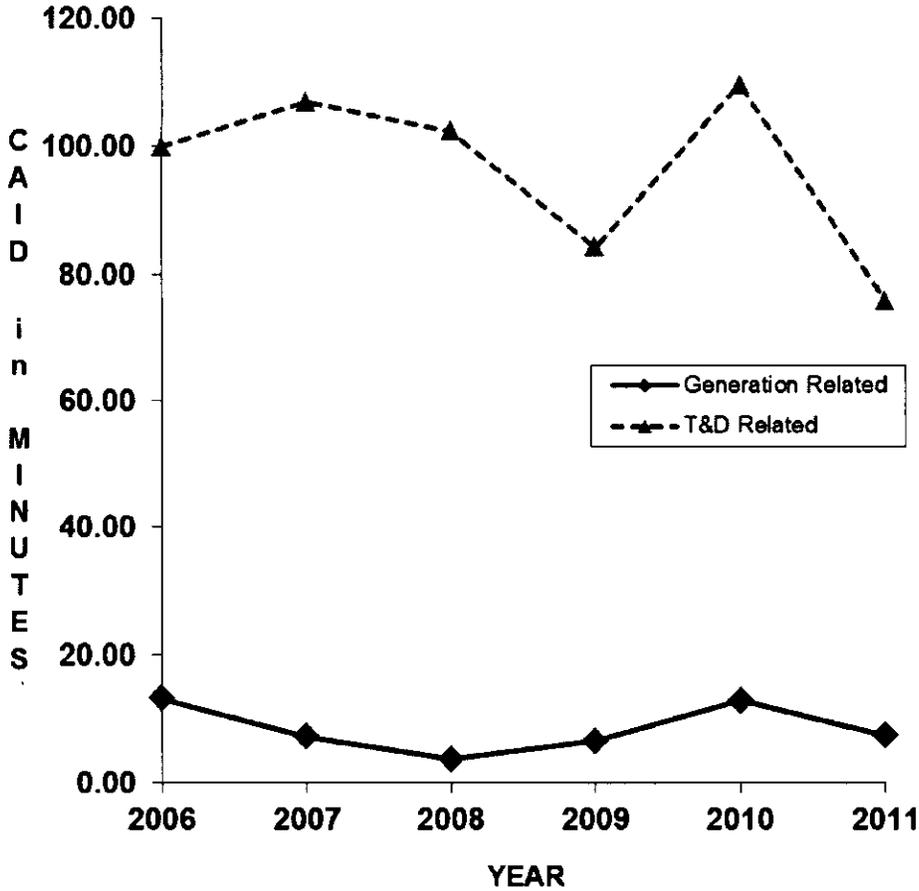
**T&D vs. GENERATION
AVERAGE SERVICE AVAILABILITY INDEX
(ASA IN %)
Not-Normalized**



SYSTEM AVERAGE INTERRUPTION FREQUENCY (SAIF) Not-Normalized



**CUSTOMER AVERAGE INTERRUPTION DURATION
(CAID)
Not-Normalized**



2011
T&D SERVICE RELIABILITY SUMMARY
 Not-Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Tree or Branches	76116.3	45152	0.559	56.52	101.15	1
Deterioration	24281.3	37112	0.459	18.03	39.26	3
High Wind	3031.8	14686	0.182	2.25	12.39	11
Auto Accident	22483.5	13029	0.161	16.69	103.54	4
Tsf Failure	20890.4	12341	0.153	15.51	101.57	5
Lightning	17801.2	11669	0.144	13.22	91.53	6
Other Persnl Err	568.3	8126	0.101	0.42	4.20	17
Scheduled Maint	26219.9	6654	0.082	19.47	236.43	2
Unknown	6327.1	6562	0.081	4.70	57.85	8
Cable Fault	11070.3	6243	0.077	8.22	106.39	7
Equip Failure	2208.2	5561	0.069	1.64	23.83	12
Faulty Equip Opn	1826.1	5523	0.068	1.36	19.84	14
Forced Maint	1915.1	2589	0.032	1.42	44.38	13
Flashover	6071.5	2393	0.030	4.51	152.23	9
Equip Overload	4921.5	2206	0.027	3.65	133.86	10
Flood / Tsunami	1227.4	329	0.004	0.91	223.84	15
Man or Animal	459.7	316	0.004	0.34	87.28	18
Balance Load	575.3	164	0.002	0.43	210.46	16
Excavate Constr	332.7	63	0.001	0.25	316.81	19
Equip Contact	32.6	12	0.000	0.02	163.00	20
Tsf Overload	15.2	12	0.000	0.01	76.00	22
Loose Connection	14.8	10	0.000	0.01	88.80	24
Vandalism	15.0	5	0.000	0.01	179.60	23
Fire	17.8	4	0.000	0.01	266.25	21
Foreign Objects	2.4	3	0.000	0.00	48.67	26
Customer Equip	5.6	3	0.000	0.00	112.33	25
Balloon/Kite	0.2	2	0.000	0.00	5.00	28
Sys Add/Removal	1.0	1	0.000	0.00	60.00	27
Transfer Load	0.0	0	0.000	0.00	0.00	31
Opn or Sw Error	0.0	0	0.000	0.00	0.00	29
Customer Maint	0.0	0	0.000	0.00	0.00	30
TOTAL	228431.9	180770	2.237	169.61	75.82	

NUMBER OF CUSTOMERS FOR THE 80807 % ASA = 99.967

SAIF = SYSTEM AVERAGE INTERRUPTION

SAID = SYSTEM AVERAGE INTERRUPTION DURATION

CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2011
GENERATION SERVICE RELIABILITY SUMMARY
Not-Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Faulty Equip Opn	5817.4	56071	0.694	4.32	6.23	1
Customer Equip	7871.0	53775	0.665	5.84	8.78	2
Man or Animal	0.0	0	0.000	0.00	0.00	3
Tsf Overload	0.0	0	0.000	0.00	0.00	3
Other Persnl Err	0.0	0	0.000	0.00	0.00	3
Forced Maint	0.0	0	0.000	0.00	0.00	3
Scheduled Maint	0.0	0	0.000	0.00	0.00	3
Equip Failure	0.0	0	0.000	0.00	0.00	3
Balloon/Kite	0.0	0	0.000	0.00	0.00	3
Unknown	0.0	0	0.000	0.00	0.00	3
Customer Maint	0.0	0	0.000	0.00	0.00	3
Sys Add/Removal	0.0	0	0.000	0.00	0.00	3
Balance Load	0.0	0	0.000	0.00	0.00	3
Transfer Load	0.0	0	0.000	0.00	0.00	3
Flood / Tsunami	0.0	0	0.000	0.00	0.00	3
Deterioration	0.0	0	0.000	0.00	0.00	3
Auto Accident	0.0	0	0.000	0.00	0.00	3
Tsf Failure	0.0	0	0.000	0.00	0.00	3
Cable Fault	0.0	0	0.000	0.00	0.00	3
Flashover	0.0	0	0.000	0.00	0.00	3
Loose Connection	0.0	0	0.000	0.00	0.00	3
Opn or Sw Error	0.0	0	0.000	0.00	0.00	3
Equip Overload	0.0	0	0.000	0.00	0.00	3
Lightning	0.0	0	0.000	0.00	0.00	3
Vandalism	0.0	0	0.000	0.00	0.00	3
Excavate Constr	0.0	0	0.000	0.00	0.00	3
Equip Contact	0.0	0	0.000	0.00	0.00	3
Fire	0.0	0	0.000	0.00	0.00	3
Tree or Branches	0.0	0	0.000	0.00	0.00	3
High Wind	0.0	0	0.000	0.00	0.00	3
TOTAL	13688.4	109846	1.359	10.16	7.48	

NUMBER OF CUSTOMERS FOR THE 80807 % ASA = 99.998

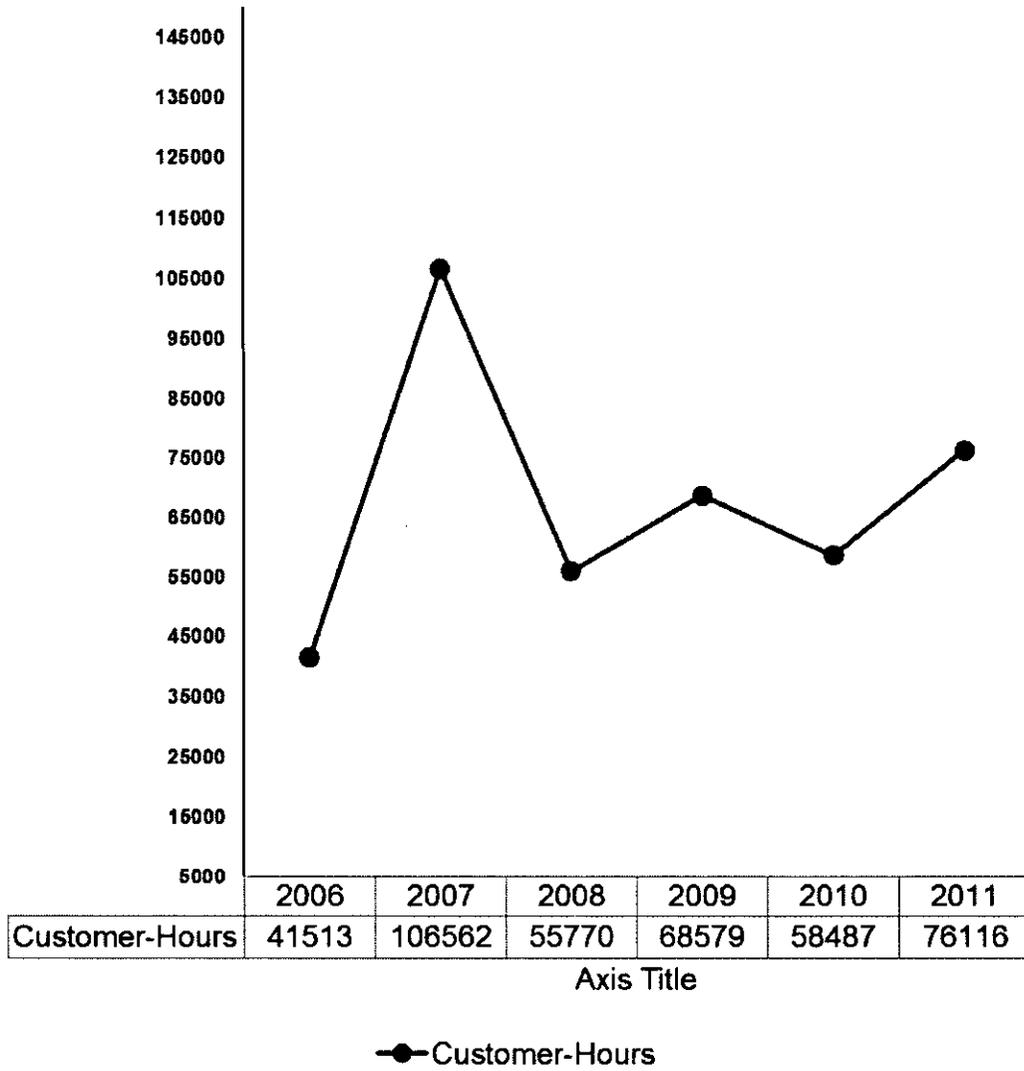
SAIF = SYSTEM AVERAGE INTERRUPTION

SAID = SYSTEM AVERAGE INTERRUPTION DURATION

CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2006-2011
INTERRUPTIONS CAUSED BY TREES & BRANCHES
Not-Normalized



APPENDIX E
HELCO vs NON-HELCO GENERATION
2006-2011 Service Reliability Indices
Not-Normalized

HELCO Generation

Year	ASA	Number of Customers	Customer Interruptions	CID	SAIF	CAID
2006	99.995	75,353	105,589	26,467	1.401	15.04
2007	99.999	77,933	28,246	3,349	0.362	7.11
2008	99.999	79,386	66,538	3,709	0.838	3.34
2009	99.998	79,679	112,196	13,347	1.408	7.14
2010	99.995	80,171	162,370	30,912	2.025	11.42
2011	99.999	80,807	56,071	5,817	0.694	6.23

Non-HELCO Generation

Year	ASA	Number of Customers	Customer Interruptions	CID	SAIF	CAID
2006	99.998	75,353	60,262	10,243	0.8	10.20
2007	99.998	77,933	64,217	7,869	0.824	7.35
2008	99.999	79,386	19,752	1,590	0.249	4.83
2009	99.999	79,679	20,660	1,224	0.259	3.56
2010	99.997	80,171	51,711	15,476	0.645	17.96
2011	99.998	80,807	53,775	7,871	0.665	8.78

2011
HELCO GENERATION SERVICE RELIABILITY SUMMARY
Not-Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Faulty Equip Opn	5817.4	56071	0.694	4.32	6.23	1
Man or Animal	0.0	0	0.000	0.00	0.00	2
Tsf Overload	0.0	0	0.000	0.00	0.00	2
Other Persnl Err	0.0	0	0.000	0.00	0.00	2
Forced Maint	0.0	0	0.000	0.00	0.00	2
Scheduled Maint	0.0	0	0.000	0.00	0.00	2
Equip Failure	0.0	0	0.000	0.00	0.00	2
Balloon/Kite	0.0	0	0.000	0.00	0.00	2
Unknown	0.0	0	0.000	0.00	0.00	2
Customer Maint	0.0	0	0.000	0.00	0.00	2
Sys Add/Removal	0.0	0	0.000	0.00	0.00	2
Balance Load	0.0	0	0.000	0.00	0.00	2
Transfer Load	0.0	0	0.000	0.00	0.00	2
Flood / Tsunami	0.0	0	0.000	0.00	0.00	2
Customer Equip	0.0	0	0.000	0.00	0.00	2
Deterioration	0.0	0	0.000	0.00	0.00	2
Auto Accident	0.0	0	0.000	0.00	0.00	2
Tsf Failure	0.0	0	0.000	0.00	0.00	2
Cable Fault	0.0	0	0.000	0.00	0.00	2
Flashover	0.0	0	0.000	0.00	0.00	2
Loose Connection	0.0	0	0.000	0.00	0.00	2
Opn or Sw Error	0.0	0	0.000	0.00	0.00	2
Equip Overload	0.0	0	0.000	0.00	0.00	2
Lightning	0.0	0	0.000	0.00	0.00	2
Vandalism	0.0	0	0.000	0.00	0.00	2
Excavate Constr	0.0	0	0.000	0.00	0.00	2
Equip Contact	0.0	0	0.000	0.00	0.00	2
Fire	0.0	0	0.000	0.00	0.00	2
Foreign Objects	0.0	0	0.000	0.00	0.00	2
Tree or Branches	0.0	0	0.000	0.00	0.00	2
High Wind	0.0	0	0.000	0.00	0.00	2
TOTAL	5817.4	56071	0.694	4.32	6.23	

NUMBER OF CUSTOMERS FOR THE 80807 % ASA = 99.999

SAIF = SYSTEM AVERAGE INTERRUPTION

SAID = SYSTEM AVERAGE INTERRUPTION DURATION

CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2011
Non-HELCO GENERATION SERVICE RELIABILITY SUMMARY
Not-Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Customer Equip	7871.0	53775	0.665	5.84	8.78	1
Man or Animal	0.0	0	0.000	0.00	0.00	2
Tsf Overload	0.0	0	0.000	0.00	0.00	2
Balloon/Kite	0.0	0	0.000	0.00	0.00	2
Other Persnl Err	0.0	0	0.000	0.00	0.00	2
Unknown	0.0	0	0.000	0.00	0.00	2
Customer Maint	0.0	0	0.000	0.00	0.00	2
Sys Add/Removal	0.0	0	0.000	0.00	0.00	2
Forced Maint	0.0	0	0.000	0.00	0.00	2
Scheduled Maint	0.0	0	0.000	0.00	0.00	2
Balance Load	0.0	0	0.000	0.00	0.00	2
Transfer Load	0.0	0	0.000	0.00	0.00	2
Flood / Tsunami	0.0	0	0.000	0.00	0.00	2
Opn or Sw Error	0.0	0	0.000	0.00	0.00	2
Faulty Equip Opn	0.0	0	0.000	0.00	0.00	2
Deterioration	0.0	0	0.000	0.00	0.00	2
Auto Accident	0.0	0	0.000	0.00	0.00	2
Tsf Failure	0.0	0	0.000	0.00	0.00	2
Cable Fault	0.0	0	0.000	0.00	0.00	2
Flashover	0.0	0	0.000	0.00	0.00	2
Loose Connection	0.0	0	0.000	0.00	0.00	2
Vandalism	0.0	0	0.000	0.00	0.00	2
Equip Overload	0.0	0	0.000	0.00	0.00	2
Lightning	0.0	0	0.000	0.00	0.00	2
Equip Failure	0.0	0	0.000	0.00	0.00	2
Excavate Constr	0.0	0	0.000	0.00	0.00	2
Equip Contact	0.0	0	0.000	0.00	0.00	2
Fire	0.0	0	0.000	0.00	0.00	2
Foreign Objects	0.0	0	0.000	0.00	0.00	2
Tree or Branches	0.0	0	0.000	0.00	0.00	2
High Wind	0.0	0	0.000	0.00	0.00	2
TOTAL	7871.0	53775	0.665	5.84	8.78	

NUMBER OF CUSTOMERS FOR THE 80807 % ASA = 99.998

SAIF = SYSTEM AVERAGE INTERRUPTION

SAID = SYSTEM AVERAGE INTERRUPTION DURATION

CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2011
T&D SERVICE RELIABILITY SUMMARY
Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Tree or Branches	76116.3	45152	0.559	56.52	101.15	1
Deterioration	24281.3	37112	0.459	18.03	39.26	3
High Wind	3031.8	14686	0.182	2.25	12.39	11
Auto Accident	22483.5	13029	0.161	16.69	103.54	4
Tsf Failure	20890.4	12341	0.153	15.51	101.57	5
Lightning	17801.2	11669	0.144	13.22	91.53	6
Other Persnl Err	568.3	8126	0.101	0.42	4.20	17
Scheduled Maint	26219.9	6654	0.082	19.47	236.43	2
Unknown	6327.1	6562	0.081	4.70	57.85	8
Cable Fault	11070.3	6243	0.077	8.22	106.39	7
Equip Failure	2208.2	5561	0.069	1.64	23.83	12
Faulty Equip Opn	1826.1	5523	0.068	1.36	19.84	14
Forced Maint	1915.1	2589	0.032	1.42	44.38	13
Flashover	6071.5	2393	0.030	4.51	152.23	9
Equip Overload	4921.5	2206	0.027	3.65	133.86	10
Flood / Tsunami	1227.4	329	0.004	0.91	223.84	15
Man or Animal	459.7	316	0.004	0.34	87.28	18
Balance Load	575.3	164	0.002	0.43	210.46	16
Excavate Constr	332.7	63	0.001	0.25	316.81	19
Equip Contact	32.6	12	0.000	0.02	163.00	20
Tsf Overload	15.2	12	0.000	0.01	76.00	22
Loose Connection	14.8	10	0.000	0.01	88.80	24
Vandalism	15.0	5	0.000	0.01	179.60	23
Fire	17.8	4	0.000	0.01	266.25	21
Foreign Objects	2.4	3	0.000	0.00	48.67	26
Customer Equip	5.6	3	0.000	0.00	112.33	25
Balloon/Kite	0.2	2	0.000	0.00	5.00	28
Sys Add/Removal	1.0	1	0.000	0.00	60.00	27
Transfer Load	0.0	0	0.000	0.00	0.00	31
Opn or Sw Error	0.0	0	0.000	0.00	0.00	29
Customer Maint	0.0	0	0.000	0.00	0.00	30
TOTAL	228431.9	180770	2.237	169.61	75.82	

NUMBER OF CUSTOMERS FOR THE 80807 % ASA = 99.967

SAIF = SYSTEM AVERAGE INTERRUPTION

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CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF

2011
GENERATION SERVICE RELIABILITY SUMMARY
Normalized

<u>Cause of Outage</u>	<u>CUST-HR</u>	<u>CUST-INT</u>	<u>SAIF</u>	<u>SAID</u>	<u>CAID</u>	<u>SAID Rank</u>
Faulty Equip Opn	2802.14	28429	0.352	2.08	5.91	1
Customer Equip	1746.60	27489	0.340	1.30	3.81	2
Man or Animal	0.0	0	0.000	0.00	0.00	3
Tsf Overload	0.0	0	0.000	0.00	0.00	3
Other Persnl Err	0.0	0	0.000	0.00	0.00	3
Forced Maint	0.0	0	0.000	0.00	0.00	3
Scheduled Maint	0.0	0	0.000	0.00	0.00	3
Equip Failure	0.0	0	0.000	0.00	0.00	3
Balloon/Kite	0.0	0	0.000	0.00	0.00	3
Unknown	0.0	0	0.000	0.00	0.00	3
Customer Maint	0.0	0	0.000	0.00	0.00	3
Sys Add/Removal	0.0	0	0.000	0.00	0.00	3
Balance Load	0.0	0	0.000	0.00	0.00	3
Transfer Load	0.0	0	0.000	0.00	0.00	3
Flood / Tsunami	0.0	0	0.000	0.00	0.00	3
Deterioration	0.0	0	0.000	0.00	0.00	3
Auto Accident	0.0	0	0.000	0.00	0.00	3
Tsf Failure	0.0	0	0.000	0.00	0.00	3
Cable Fault	0.0	0	0.000	0.00	0.00	3
Flashover	0.0	0	0.000	0.00	0.00	3
Loose Connection	0.0	0	0.000	0.00	0.00	3
Opn or Sw Error	0.0	0	0.000	0.00	0.00	3
Equip Overload	0.0	0	0.000	0.00	0.00	3
Lightning	0.0	0	0.000	0.00	0.00	3
Vandalism	0.0	0	0.000	0.00	0.00	3
Excavate Constr	0.0	0	0.000	0.00	0.00	3
Equip Contact	0.0	0	0.000	0.00	0.00	3
Fire	0.0	0	0.000	0.00	0.00	3
Foreign Objects	0.0	0	0.000	0.00	0.00	3
Tree or Branches	0.0	0	0.000	0.00	0.00	3
High Wind	0.0	0	0.000	0.00	0.00	3
TOTAL	4548.74	55918	0.692	3.38	4.86	

NUMBER OF CUSTOMERS FOR THE 80807 % ASA = 99.999

SAIF = SYSTEM AVERAGE INTERRUPTION

SAID = SYSTEM AVERAGE INTERRUPTION DURATION

CAID = CUSTOMER AVERAGE INTERRUPTION DURATION

THE OUTAGE CAUSES ARE LISTED IN ORDER OF ITS SAIF